Disequilibrium Analysis of Price Formation

Disorder and Coordination in Economics

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Introduction

Jesús Huerta de Soto writes that economics, far from being a theory of choice or decision, is a theory of processes describing social interaction that bring about coordination displacing disorder; see (Huerta de Soto, 1998). It establishes the fact that, through the intervention of entrepreneurship, disorder (a state of coordination at a lower level) is promoted to a state of coordination at a higher level. Economics also establishes the fact that entrepreneurs generate and disseminate information through a system of various indicators such as prices, wages, rents, interest and discount rates.

But how do entrepreneurs diagnose disorder and, having done so, how do they bring about coordination at a higher level? How do they generate and disseminate information through the price system or other systems of economic indicators? And how does the market integrate fragmented bits of information and power residing in individual entrepreneurs, making it the driving force of coordination? These are some of the questions we wish to answer in this essay.

One important effect of entrepreneurship is the modification of the perception of means-ends nexus. New ends emerge and means for their attainment must be perfected. New means are discovered while old ones are abandoned. Coordination dispels disorder here, creating new disorder there. The parade of new opportunities for entrepreneurial action is unceasing. The never-ending sequence of disorder-coordination-disorder is the driving force of economic progress and civilization.

Of particular importance is the co-ordinating activity of the shopkeeper. He is in constant touch with the consumer, learning at first hand the extent to which the latter is dissatisfied with the kinds and prices of consumer goods displayed on the shelves. How is information represented by the scattered knowledge residing in individual shopkeepers processed? How is intelligence about the changing mood of the sovereign consumer transmitted? Only when the problem is presented in this way does it become clear that simplistic models such as the equilibrium theories, the equation of exchange and the quantity theory of money, are wholly inadequate and can never account for the complex processes involved in the formation of prices.

The static supply/demand equilibrium analysis of price formation and its offspring, the quantity theory of money, are one-dimensional. They project a black-and-white image. They look at goods in total isolation. They admit no insight

into the effect on the price of alternative products either at the input or at the output end of the production line. They make no allowance for deliberate variation of product quality on the part of the producer. A disequilibrium theory of price formation would have to be three-dimensional. It must project an image in full color. It must take the inter-dependence of the price with those of the substitutes at both the input and output level into full account.

In this essay we attempt to lay the foundations of such a disequilibrium theory. In the first part we establish arbitrage as the very driving force of the market process. We shall use the language of traders engaging in arbitrage on a daily basis. Their guiding star is the spread, that is, the difference in price between two goods (baskets of goods or, better still, baskets of goods *plus* other resources). Their basic tool is the straddle, that is, the combination of a purchase and a sale. The arbitrageur is shuffling his straddles in pursuit of pure entrepreneurial profits. To the uninitiated it may look as though the arbitrageur is being guided by intuition of some sort. But theory can expose the basic facts governing arbitrage without appealing to intuition.

The disequilibrium analysis of price formation of consumer goods to be presented here isolates three basic types of arbitrage:

1. horizontal arbitrage of the consumer using one-legged straddles responsible for the formation of the asked price;
2. vertical arbitrage of the producer using two-legged straddles responsible for the formation of the bid price; and
3. bid/asked arbitrage of the market-maker using four-legged straddles which is responsible for closing the bid/asked spread.

In the second part of the paper we discuss the coordination problem of economics in terms of the landscape of spreads. Entrepreneurs are addressing themselves to selected spreads through arbitrage. Horizontal arbitrage, using one-legged straddles, has a role to play in retrospective (backward-looking) or defensive strategies designed to protect profitability, including deliberate variation of product quality to increase capacity utilization. Vertical arbitrage using four-legged straddles has a role to play in prospective (forward-looking) or aggressive strategies designed to uncover hitherto unexplored spreads. Pure entrepreneurial profits depend on the producer's skill in meshing these strategies.

The third part of this essay deals with the coordination problem as it confronts the retail trade, as well as international trade. Neither the law of supply and demand nor the quantity theory of money applies in these markets: we must appeal to a disequilibrium model. An increase in the volume of purchasing media due to higher spending or an influx of foreign exchange has no inevitable effect on prices but will, instead, lower the discount rate. We must analyze short-term capital movements in terms of the widening spread between the discount rate and the marginal productivity of social circulating capital. We must take arbitrage between the bill market and the consumer goods market into account. The lowering of the discount rate is equivalent to an increase in the marginal productivity of social circulating capital. Increased demand brings out increased supply sufficient to accommodate it, with no increase in prices. Price changes, whenever they occur, reflect coordination involving other factors.

In company with Jesús Huerta de Soto I maintain that it is possible to explain the market process: the formation of prices, rents, wages, interest and discount rates, without reference to equilibrium models, merely by focusing on dynamic processes. As a first step, here we develop the disequilibrium analysis of price formation.

Part 1: Arbitrage

Whether recognized or not, arbitrage is the driving force of the market process. It is present in every market action, even though sometimes it may well be hidden. It is not generally recognized that barter —a sale and a purchase 'telescoped' into a single transaction— is an instance of arbitrage. By the same token so is every purchase, since an explicit choice always incorporates the implicit rejection of the nearest alternative. In this paper the word arbitrage is used in the broadest possible sense, in order to unify seemingly fragmented entrepreneurial activities and seemingly unrelated sources of pure entrepreneurial profit. Arbitrage is a market strategy, shifting the emphasis from sales to straddles and from prices to spreads.

Spreads and Straddles

A *straddle* is a market position with a long and a short leg. The long leg could be an outright purchase but, more typically, it is a commitment to buy or, just as typically, the liquidation of a commitment to sell. The short leg could be an outright sale but, more typically, it is a commitment to sell, or the liquidation of a commitment to buy. These commitments, as well as their liquidation, are always made at the current price. Each straddle belongs to a *spread*, namely, the difference between the prices at which the commitments to buy and sell have been made (sale price less purchase price).

The spread, like the price, is subject to change. But the information-content of a change in the spread, unlike that in the price, is highly significant. Indeed, the importance of arbitrage, and the reason why human action should be viewed from the vantage point of the spread rather than that of the price, is found in the fact that a single move in the price is mostly random. By contrast, in a well-traded market, a single move in the spread is not random. It is a signal carrying an important message. The knowledgeable arbitrageur can read it and make most of it. This ability of his is the true source of pure entrepreneurial profit.

Our starting point is the fundamental observation of Carl Menger in *Principles of Economics* (Menger, 1981) that there is no such thing as a monolithic price. Markets do, in fact, quote not one but two prices: one higher and the other lower. In market parlance the higher one is called the *asked price*, while the lower is the *bid price*. The two are never equal, so that the bid/asked spread (asked minus bid price) is always positive. The fundamental question is this: how are the bid and asked prices formed? We shall see that, in fact, two entirely different processes are involved. The asked price is the outcome of competition on the part of the consumers (*sic!*), whereas the bid price is the outcome of competition on the part of the producers (*sic!*). Either process can be properly described as arbitrage, attacking a certain spread, using a certain type of straddle.

Four-legged Straddles

When the arbitrageur sees a profitable spread, say, he finds the price of an item x too low while that of a related item y too high, he moves to set up his initial straddle consisting of the *initial long leg* (commitment to buy x) and the *initial short leg* (commitment to sell y) at the prevailing prices. In market parlance he has entered the market for x with his long and that for y with his short leg. The arbitrageur expects his spread to widen (to narrow in absolute value if the initial spread was negative). If the market moves in his favor, he takes profit by offsetting his straddle: he enters the same markets once more with long and short legs switched around. His opposite straddle consists of the *terminal short leg* (liquidating the commitment to buy x) and the *terminal long leg* (liquidating the commitment to sell y) at the new prices. His profit is the net change in the spread (terminal minus initial spread; if negative, he has made a loss). We refer to this as a *four-legged straddle* as profits from the arbitrage can be calculated only after all four legs are in place.

Four-legged arbitrage is the basic strategy of warehousing. Suppose a grain-elevator operator normally fills one of his two bins with corn and the other with wheat. Further suppose that as a result of poor weather in the wheat-growing regions he expects the corn/wheat spread (wheat price minus corn price) to widen. Acting on this insight he sells his corn (initial short leg) and buys wheat, filling his corn bin with wheat (initial long leg). When his expectation is fulfilled and the corn/wheat spread has widened, he sells his wheat in the corn bin (terminal short leg) and buys corn refilling his corn bin (terminal long leg). Since the profitability of the arbitrage can be established only after all four legs are in place, this is a four-legged straddle.

The bid/asked arbitrage of the market-maker also uses four-legged straddles. In this case all four legs are in the same market. The market-maker, as it were, is 'warehousing' long and short positions in the same commodity, closing them out as the price is moving in his favor.

The foreign exchange trader's basic tool is also the four-legged straddle. His business also has the characteristics of warehousing. To catch a glimpse of the true significance of the four-legged straddle, consider the fact that the volume of trade in the world's foreign exchange markets is estimated at a mind-boggling one and one quarter trillion dollars per day —more than the annual budget of the U.S. government! Virtually all of this trading is hedged, that is, transacted through the vehicle of four-legged straddles. The importance of

the four-legged straddle goes beyond these examples which are special in that the terminal legs liquidate the respective commitments of the initial legs. In the most general case this restriction is removed. In the second part of this paper we shall see examples of four-legged straddles with each leg in a different market.

Two-legged Straddles

Consider the vertical arbitrage of the producer. The long leg x of his straddle is in the producer goods market and the short leg y is in the consumer goods market, where x is the input and y is the output of his production line. This is an example of a two-legged straddle, since profits from the arbitrage can be calculated already when the first two legs are in place. We reduce this to a four-legged straddle by adding two terminal legs at zero prices (so that entering the phantom legs won't disturb the profitability of the arbitrage). The phantom legs are entered in order to satisfy the requirements of double-entry book-keeping. The four legs are:

1. placing an order for x (initial long leg)
2. taking an order for y (initial short leg)
3. taking delivery of x (terminal short leg)
4. making delivery of y (terminal long leg)

One-legged Straddles

Consider the horizontal arbitrage of the producer. He buys the favored producer good x (his present input) while he refrains from buying the disfavored one y (his former input). Thus he creates a straddle with long leg x and short leg y, and the corresponding spread shows the profit (saving) that arises out of his switching from y to x. This is called a *one-legged straddle*, because the profit from the arbitrage can be calculated already when the single long leg x is in place. To satisfy the requirements of double-entry book-keeping, we reduce this to a four-legged straddle by entering three phantom legs. The four transactions are:

1. placing an order for x
2. cancelling the order for y
3. taking delivery of x
4. taking credit for cancelling the order for y

As in the previous case, these form a four-legged straddle. The terminal legs are entered at zero prices so as not to disturb profitability. We are now ready to present the disequilibrium analysis of the price formation of consumer goods in three steps: the formation of the asked price, the formation of the bid price, and the closing of the bid/asked spread.

Formation of the Asked Price

As noted already, the asked price is the outcome of the competition of the consumers. In more details, *the asked price a of the consumer good x marks the point where the opportunity cost of buying an additional unit of x becomes critical to the marginal consumer. He is the first consumer to refuse to buy the uptick in the price of x —in view of his opportunity to buy a substitute, say, the consumer good x'.*

Consumers are doing horizontal arbitrage all the time: they constantly shift their custom. Their guiding star is the constellation of horizontal spreads. As a result of their competition, horizontal spreads will widen. But the spreads which belong to the one-legged horizontal straddles with the same long leg x cannot continue to widen indefinitely. Their widening will be checked by the marginal consumer of x. His refusal to buy x, and his buying x' instead constitutes an opposite horizontal straddle and entering it will stabilize the spread.

Of course, the person of the marginal consumer, and the item x' he substitutes for x, are subject to change. Whenever another consumer takes over that role from the first the item x'' he substitutes for x may well be different from x'. Indeed, over a period of time when the price of x is undergoing a change, hundreds of different people may, one after another, play the role of the marginal consumer of x, while x' sweeps through the spectrum of all possible substitutes for x. This picture can be simplified if we personify the marginal consumer of x and think of him as a figure skater skating in the rink of consumer goods. His long leg is anchored to x while his short leg is skating through the possible substitutes of x. This, then, is the mechanism whereby the market integrates the fragmented knowledge of and power over the price of x that resides in individual consumers, crystallizing it in the form of a single indicator: the asked price for x.

Formation of the Bid Price

Recall that the asked price is the outcome of the competition of the consumers. Now we shall see that, by contrast, the bid price is the outcome of the competition of the producers. Here are the details.

The bid price b of the consumer good x marks the point where the opportunity cost of selling an additional unit of x becomes critical to the marginal producer. He is the first producer to refuse to sell the downtick in the price of x —in view of his opportunity to refuse to buy the producer good y, his input in the production of x.

All producers of x are doing vertical arbitrage between consumer and producer goods all the time: they constantly shift their production lines from one vertical straddle to another. Their guiding star is the constellation of vertical spreads. As a result of the competition of producers the vertical spreads will shrink. But the spreads which belong to the two-legged vertical straddles with the same short leg x will not keep shrinking indefinitely. Their shrinking is checked by the marginal producer of x. His refusal to sell x and his refusal to buy y constitutes an opposite vertical straddle, and entering it will stabilize the spread.

Of course, the person of the marginal producer of x, and his input y, are subject to change. When another producer takes over that role from the first, the item y' he uses as his input for the production of x may not be the same as y. Indeed, over a period of time when the price of x undergoes a change, hundreds of different people may, one after another, play the role of the marginal producer of x, while y' sweeps through the spectrum of alternative inputs suitable for the production of x. This picture can be simplified if we personify the marginal producer of x and imagine that his short leg is anchored to x on the bottom rung of a ladder, while his long leg is trying to get a firm foothold on the next rung, touching the alternative inputs suitable for the production of x. This, then, is the mechanism whereby the market integrates the scattered knowledge of and power over the appropriate level of the price of x that resides in the individual producers, crystallizing it in the form of a single indicator: the bid price of x.

Our results can be summarized as follows. The asked price is determined by marginal utility. It can be characterized as the lowest price at which consumers can buy as much as they want without haggling —explaining how the asked price earns its name. The bid price is determined by the marginal profitability of production. It can be characterized as the highest price at which producers can sell all they have without haggling —explaining how the bid price earns its name. It follows that marginal utility must be higher than marginal profitability (otherwise no production will take place).

Closing the Bid/Asked Spread

In the very nature of the case $a > b$, so there is a positive bid/asked spread a - b. The existence of a positive spread, as always, invites arbitrage. The arbitrageur attacking the bid/asked spread is called the market-maker (on the floor of the New York Stock Exchange, the specialist). The market-maker buys at the lower bid price and sells at the higher asked price (while everybody else must, unless prepared to haggle, buy at the asked and sell at the bid price). The guiding star of the market-maker is the bid/asked spread. Competition of market-makers causes the bid/asked spread to shrink. But the process of shrinking the bid/asked spread will not continue indefinitely. It will be checked by the marginal market-maker, whose withdrawal from arbitrage will stabilize the spread. Usually the spread is negligible (hence the impression of a single monolithic price). It's clear that the spread is determined by the marginal profitability of the market-making business. Note the beneficial effect of the bid/asked arbitrage. Everybody benefits: the consumer enjoys a lower buying price, the producer is rewarded by a higher selling price. The analysis of the market process cannot be complete without the inclusion of the arbitrage of the market-maker.

Of course, the three components of arbitrage (horizontal, vertical, and bid/asked arbitrage) are carried on simultaneously and continuously —not one after another as the theory might suggest. The decomposition of market agitation into three separate components has purely methodological significance. This completes the marginal analysis of the price formation of consumer goods. The corresponding analysis of the price formation of producer goods can be given *mutatis mutandis* (see below).

The Sovereignty of the Consumer

Competition of the producers may or may not have the effect of lowering the bid price of x. The marginal producer is confronted with the choice whether to compete or not to compete. If he decides to compete, he will adjust his selling price to that of his competition, and will try to restore profitability through horizontal arbitrage. If he decides not to compete, he will drop out of the ranks of producers and another man will take over as the marginal producer of x. In either case, the bid price will get lowered, with the asked price (driven by bid/asked arbitrage) to follow hard on its heels. This is what happens in the case competition is keen. If competition is dull, the marginal producer may prevail in his effort to hold the bid price.

Analogously, competition of the consumers may or may not have the effect of raising the asked price. *But the two cases are far from being symmetrical*. The fact is that a rise in the asked price has an additional consequence. Unlike the lower bid price, a higher asked price tends to widen the vertical spread. This will bring out fresh competition for the producers. While a price rise induced by increased consumer demand are mostly temporary, lasting only as long as it takes for the producers to adjust, a decrease in price due to increased production, to the extent they reflect technological improvements and increased productivity, are mostly permanent. (Example: the dramatic fall in the price of personal computers). This is the *feedback effect*: increased competition on the part of the consumers brings about increased competition on the part of the producers. But note the absence of a feedback in the opposite direction. We conclude that *consumers have a veto power over the marginal producer. The predominant role in the process of price formation belongs to the consumers*. The role of the producers is subordinate. Because of this bias in favor of the consumer, marginal utility may be considered the primary factor in the formation of the price, while marginal profitability is secondary. This lack of symmetry between horizontal and vertical arbitrage is often referred to as the Principle of Sovereignty of the Consumer.

Critique of Equilibrium Analysis

The superiority of our disequilibrium analysis over the conventional supply-and-demand equilibrium analysis of price formation is clear. The latter is a black-and-white, one-dimensional shadow of reality. It looks at the consumer good (together with its price and quantity) in total isolation. It doesn't admit any insight into the effect on the price of alternative inputs or outputs, nor can it handle deliberate producer-induced changes in quality. By contrast, the disequilibrium analysis of price formation presents a three-dimensional image of reality in living color. It takes the interdependence of prices with those of alternative consumer goods at the level of output, as well as with those of alternative producer goods at the level of input, into full account. It can well handle the problem of deliberate producer-induced changes in quality. Disequilibrium analysis puts the market process, and the role of arbitrage in it, into high relief.

F. A. Hayek in *Prices and Production* (Hayek, 1967) and Ludwig von Mises in *Human Action* (Mises, 1963) clearly recognized the entrepreneurial activity of producers in setting up vertical straddles to attack selected vertical spreads. (Needless to say, they used a different terminology). The adjective "vertical" relates to the vertical structure of goods due to Menger, elaborated in Israel M. Kirzner's *Market Theory and the Price System* (Kirzner, 1963). This is a classification of goods according to their remoteness from the final consumer. Consumer goods are first order goods while those entering into the input of the production of consumer goods are of the second order. In general, goods that enter into the input of the production of n^{th} order goods are of order $n+1$. Calling the straddle of the producer with commitments to buy an $(n+1)^{th}$ order good and to sell an n^{th} order good "vertical" is just a plausible extension of Menger's original terminology.

Horizontal straddles and spreads are to be understood in exactly the same sense. The choice of the adjective here was inspired by Kirzner's concept of "horizontally related goods and markets" mentioned in (Kirzner, 1963). In his book *Competition and Entrepreneurship* (Kirzner, 1973) Kirzner also provides an important example of a horizontal straddle. It is the market position of the producer of a consumer good y who discovers that consumers are willing to pay more for y', another consumer good that he can produce out of the same input basket x. Accordingly, the producer switches production from y to y' to increase profitability. Notice that the producer has created a

one-legged horizontal straddle at the level of first order goods, with the significant leg being the initial short leg y'. Of course, the producer of n^{th} order goods can also avail himself of one-legged horizontal straddles in order to improve profitability. Complementary to this there is another type of horizontal arbitrage that will play a role in the marginal analysis of the formation of the asked price of an n^{th} order good. The producer may want to increase profitability by replacing his input basket x by a cheaper one x'. In the latter case the producer's horizontal straddle is at the level of $(n+1)^{th}$ order goods; in the former, it is at the level of n^{th} order goods.

By a simple extension of this terminology to the level of first order goods we may also call the market position of the consumer, who is shifting his custom from one product to another, a one-legged horizontal straddle at the level of consumer goods. None of the aforementioned authors referred to these entrepreneurial activities by the name arbitrage. But to do so is helpful in the present context as it brings out the important common element in the seemingly unrelated activities of the entrepreneurs, and it makes the classification of entrepreneurial activities possible. By the same token, consumer buying should also be recognized as an instance of horizontal arbitrage. After all, every purchase is an explicit choice involving the implicit rejection of the nearest substitute. It is true that the savings that arise out of the consumer's horizontal arbitrage are not normally regarded as profits. There is no need to quibble over semantics. It would appear to be inconsistent to dismiss the consumer's activity of comparing prices and quality before buying as non-entrepreneurial in character, having accepted as entrepreneurial the producer's analogous activity of "shopping around" for alternative inputs —which certainly makes a direct contribution to profitability of the enterprise.

Price Formation of Producer Goods

Marginal analysis is readily extended to the price formation of n^{th} order goods. The asked price is the outcome of competition of the users of an n^{th} order good doing horizontal arbitrage in terms of one-legged straddles. *In more details, the asked price of an n^{th} order good x marks the point where the opportunity cost of buying an additional unit of x becomes critical to the marginal user of x. He is the first among the producers of goods of order $n-1$ in refusing to buy the uptick in the price of x —in view of his opportunity to buy a substitute, another producer good x' of order n instead*. The bid price of an n^{th} order good is the outcome of competition of producers doing vertical arbitrage between goods of order n and $n+1$ using two-legged straddles. In more details, *the bid price of an n^{th} order good marks the point where the opportunity cost of selling an additional unit of x becomes critical to the marginal producer of x. He is the first among the producers to refuse to sell the downtick in the price of x —in view of his opportunity in refusing to buy the producer good y' of order $n+1$, the input of the production line for x*.

We have noted earlier the Principle of Sovereignty of the Consumer in the context of the production of consumer goods. The same principle extends to the production of higher order goods. The role of the producer whose product is less remote from the ultimate consumer is dominant, the role of the producer whose product is more remote is subordinate. (From this remark the Principle of Imputation can be easily derived.)

It often happens that a higher order good serves as input for the production of several goods of different orders. For a long time coal was a consumer good as well as a producer good. Platinum is a second order good in artistic applications (e.g., in making jewelry), but it also serves as a higher order good in industrial applications (e.g., in making catalytic converters). Whenever a product serves both as an m^{th} and an n^{th} order good we may assume that the formation of the asked and bid price takes place at both levels. Should there be a substantial difference, multilateral arbitrage would close the spread between the gaping prices. (Exception: negotiated prices for industrial applications. For example, it is known that the platinum mining industry sells most of its production at negotiated prices which are normally set below the free market price. Not only does the industry lock in a price in this way, but it also carves out a market share in advance. Industrial consumers are, by contract, barred from reselling platinum in the free market, as this would defeat the purposes of the producer.)

Part 2: The Coordination Problem in Economics

We are now ready to discuss the coordination problem of economics and to see how entrepreneurs approach it through arbitrage. It will appear that our introduction of arbitrage as the generic form of human action, that underlies all the multifarious activities of entrepreneurs in pursuit of pure entrepreneurial profits, is insightful. It focuses on what is important while de-emphasizing what is less important or unimportant in the activities of entrepreneurs when looked at from the point of view of the market process. It also leads to the classification of entrepreneurial strategies as we treat the coordination problem.

The Coordination Problem and the Landscape of Spreads

Lack of coordination or the presence of disorder in society represents an opportunity for gain, even though every instance of this remains hidden to most observers until it is exposed by entrepreneurship. Once the opportunity is being exploited, coordination overtakes disorder and the profit potential disappears. *There prevails in society a spontaneous tendency for greater coordination driven by entrepreneurship. In fact, it is the existence of this process that makes it possible to have theoretical economics as opposed to economic history*. But how does the entrepreneur diagnose the presence of disorder? He surveys the landscape of spreads. The latter furnishes an accurate picture of the state of coordination or the lack of it. In more details, narrow spreads indicate a higher and wide spreads indicate a lower state of coordination. The entrepreneur picks a spread that appears unreasonably wide to him. He then exerts his coordinating influence on the spread through arbitrage using the corresponding straddle.

The landscape of spreads is not to be visualized as rigid relief map but rather as a fine cobweb, every node of which is interconnected with every other. Disturbance at one node will affect the state of every other node. Accordingly, the entrepreneur attacking one spread through arbitrage will transmit information to and will influence the width of every other spread.

In order to understand the coordination process more fully we must look at various entrepreneurial strategies. We isolate two of them: the defensive or retrospective (backward-looking) strategies utilizing horizontal arbitrage, and the aggressive or prospective (forward-looking) strategies utilizing vertical arbitrage. As we have seen, producers of n^{th} order goods act as arbitrageurs on three counts: (1) they are doing vertical arbitrage between the n^{th} and $(n+1)^{th}$ order goods; (2) they are doing horizontal arbitrage at the level of output (goods of order n); and (3) at the level of input (goods of order $n+1$). Different types of arbitrage have different roles to play in the market process. First we look at the role of horizontal arbitrage.

Defensive Strategies and Horizontal Arbitrage

As a direct result of production, vertical spreads will narrow, squeezing profits. This effect is natural, it is to be expected, and all producers ought to be fully prepared to meet the challenge presented thereby. Eroding profitability can be restored, at least to some extent, through horizontal arbitrage at either end of the production line. The alert producer explores alternative inputs, as well as alternative outputs, compatible with his existing plant and equipment.

As we may recall, this retrospective (or defensive) strategy aiming at the restoration of profitability can be described as horizontal arbitrage in terms of one-legged straddles. If the producer replaces his input basket x by a cheaper one x', he has created a one-legged horizontal straddle whose significant leg is the long leg x'. Alternatively, if he replaces his output y by another y' which uses the same input but is expected to fetch better prices, he has created a one-legged horizontal straddle whose significant leg is the short leg y'.

One sign of eroding profitability is that the production plant is operating far below full capacity. Cutting the price of x outright at a time when profits are squeezed might be a short-sighted strategy and is likely to be counter-productive. (While not a suitable defensive strategy, price-cutting might be effective as an aggressive strategy aiming at increasing the market-share.) But the producer may have recourse to horizontal arbitrage as a more appropriate defensive strategy. Variation in product quality, complementing variation in price, is an important device to improve profitability. The producer puts an alternative product on the market,

say, a higher-quality edition x' of x that could be sold at a higher price with only a minor increase in cost.

Suppose that the production capacity of the plant is 100 units of x per day, but only 60 units can be sold at the price of \$3, grossing \$180 per day. The producer tries to sell 30 units of x' at the price of \$4 while cutting the price of x to \$2 in the hope that he could increase his sale of x to 70 units. This would increase his gross intake to \$240 per day achieving, incidentally, full capacity utilization. The producer could afford to spend an additional \$1 per unit of x' to increase quality. If he did, his total profit would still be higher (as long as he could keep the cost of input down to less than \$1.25 per unit of x.)

Deliberate variation in product quality is an important tool in the hands of the producer to compensate for the erosion of profitability. Equilibrium analysis of price formation is designed to handle the problem of variation in quantity, but it is at a loss to handle the problem of variation in quality by the producer. We may note in passing that increasing sales will increase profitability in two ways: a larger number of units sold usually means (1) larger total profits, as well as (2) higher profits per units sold. Indeed, as the depreciation schedule for capital equipment falls upon a larger number of units, the depreciation quota per unit of production becomes smaller. However, depreciation is a cost and as such it enters the input basket. A smaller depreciation quota implies higher profits per units sold.

Aggressive Strategies and Vertical Arbitrage

Prospective (forward-looking) or aggressive strategies become important when defensive strategies no longer suffice to protect profitability. As pure entrepreneurial profits are ephemeral and elusive, it is incumbent upon the alert producer-entrepreneur to make timely preparations for the day when his vertical spread has been exploited to the fullest, and profitability can no longer be restored through horizontal arbitrage. At that point he abandons his vertical spread and scraps his equipment. He must find a new, wider, and more promising vertical spread waiting to be exploited. To attack this new spread he must initiate the corresponding straddle. He must buy new equipment and must set up a new production line.

To be sure, it is possible to continue production without the benefit of pure entrepreneurial profits indefinitely. But this would involve taking capital losses periodically. Let us assume that the proceeds from sales are sufficient to cover the cost of all resources expended in the production effort in full, with the sole exception of the return to capital invested. This means that capital can no longer be amortized as called for by the original schedule: its value must be revised downwards so that the insufficient return can continue to amortize the reduced capital value at the current rate of interest. The resulting capital losses are simply passed on to the shareholders, who are forced to absorb it in the form of a reduced (or cancelled) dividend income. It is clear that marginally profitable enterprises are at the mercy of the rate of interest. A rise in the rate of interest would render the enterprise submarginal (i.e., a loss-maker). The profit margin is seen as the very cushion sheltering the enterprise from an untoward rise in the rate of interest.

But of the greatest importance to us are precisely those enterprises that can, thanks to alert entrepreneurship, generate pure entrepreneurial profits consistently. Mark the word "consistently". It is one thing to make profit sporadically; it is quite another to make it consistently. As we have seen, the skill to make profit consistently is crucial: it is precisely this skill that shelters the shareholders from suffering capital losses. An important aspect, not sufficiently recognized in the scholarly literature, is the social role of pure entrepreneurial profits. In the modern world most production takes place within the corporate framework, and most retirement pension plans depend on the integrity of the dividend income derived from the ownership of industrial shares. The pension plan will have to declare bankruptcy eventually if the stocks in its portfolio are exposed to periodic capital losses. One can hear a lot of exhortation concerning the need to prod firms to be "good corporate citizens" —to wit: worry about profits less, and worry about civic duties more. The loose talk about corporate citizenship and civic duties misses the point completely. Profits are to be worried about indeed, because they are ephemeral, elusive, opportunities to generate them are hard to find, and because profits play such an important social role in protecting the source of income for the retired segment of the population.

Depreciation Quotas

What is the "secret" of those entrepreneur-producers who can consistently generate pure entrepreneurial profits? The secret can be found in their strategy to shift their production line, in a timely fashion, through four-legged vertical straddles.

First of all, the provident producer must be aware that profits are ephemeral. He must understand that the more successful he is in producing consumer goods, the faster the vertical spread he is attacking will erode, and the greater his need to find an alternative vertical spread will become. The temptation is ever present for the successful producer to rest on his laurels, and to continue doing what he has been successful in doing. However, in the real world of ephemeral profits such an attitude is bound to back-fire. The initially successful producer will turn out to be a failure after all, unless he is on his toes at all times.

Secondly, the provident producer must set his depreciation quotas high enough: they must cover the possibility that his plant and equipment become obsolete prematurely. The useful life of plant and equipment is not determined solely by physical criteria having to do with wear-and-tear. It could also be shortened by virtue of shifting consumer preferences, which is impossible to predict. To be sure, higher depreciation quotas will increase costs, thus reducing entrepreneurial profit. But this part of lost profits may be recaptured later, after the value of plant and equipment will have been written off completely, when depreciation costs no longer weigh down input. The producer who is in the habit of setting his depreciation quotas by relaxed standards is living in a fool's paradise. In addition, the provident producer will also set aside a quota dedicated to research and development (R&D). These funds are dedicated to support the inventor and the technologist in developing new products and better production methods. This will help slowing down the erosion of profitability later, and offer a better chance of finding new profitable vertical spreads. To be sure, R&D quotas will increase costs and thus reduce profitability initially. But it would be short- sighted to do without them. They are the very goose to lay the golden eggs of future profits. If there is no room for R&D quotas in view of insufficient profits, then the production effort probably cannot be justified in its present form.

The Chimaera of Inconvertible Capital

Above all, the provident producer is very much alive to the fact that the vertical spread he has set out to attack is shrinking relentlessly, forever squeezing profits. He is making timely preparations for the day when his vertical spread is exploited to the fullest, forcing him to move on to greener pastures. He is constantly on the look-out for wider and more promising vertical spreads waiting to be exploited. When the day comes, he will be ready. He will stop producing x and start producing x'.

It is a frequent objection that switching from one production line to another is a costly move. It involves scrapping old plant and equipment and buying new ones. Scrapping may involve huge losses in view of low scrap values relative to the high price of new plant and equipment —hence the chimaera of inconvertible capital.

The objection is not valid. There is no such a thing as inconvertible capital —there are only insufficient depreciation quotas. Had these quotas been set with greater foresight, the full value of the old capital and equipment would have been written off by the time switching fell due, and there would have been no losses on that account. When plant and equipment are fully amortized, the vertical spread gets wider by the amount of depreciation no longer to be charged. But this once-in-a-lifetime shot-in-the-arm is no more than a temporary reprieve. The natural shrinkage of the vertical spread is going on unabated, putting the entrepreneur on red alert that the time to make the switch from one production line to another is fast approaching.

The aggressive (prospective) strategy in the pursuit of pure entrepreneurial profits can be described as vertical arbitrage in terms of four-legged straddles as follows. When the producer finally makes his switch from the old production line with input y and output x to the new production line with input y' and output x', he has created a four-legged vertical straddle with initial short leg y and initial long leg x; terminal long leg y' and terminal short leg x'. Note that this four-legged vertical straddle is of the most general kind. The terminal legs are no longer backward-looking as in previous examples where they simply liquidate the commitments created by the initial legs, but they are forward-looking as they enter new markets. In fact, each of the four legs is in a different

market.

The calculation of pure entrepreneurial profit follows the same formula "terminal minus initial": the new vertical spread minus the old. This means that the producer can reap pure entrepreneurial profit consistently, provided that he makes a timely switch from one vertical spread to another as soon as the profitability of the former erodes sufficiently, and the profitability of the latter is sufficiently high.

Marx and Keynes have made the prophecy notorious that profitability will eventually become extinct and the capitalist mode of production will reach its state of "maximum entropy". Only people who are utterly unable to understand the true nature of entrepreneurship and the inventiveness of the human mind could believe that. It is true that finding more profitable vertical spreads is getting ever more difficult. But the alert producer will always find them, partly because of the providence of entrepreneurs earmarking funds for R&D, and partly because of the exploration of others in search of cheaper and better sources of raw materials and energy.

Part 3: The Disequilibrium Analysis of Retail Trade

In dismissing the supply/demand equilibrium theory we must explain price formation in the retail trade on the basis of disequilibrium principles. As we shall see, the adjustment mechanism works not on the prices of goods but on the marginal productivity of social circulating capital as measured by the discount rate. (We must sharply distinguish between the discount rate and the rate of interest. The former is regulated by the propensity to consume, the latter by the propensity to save. Either rate may move while the other is stationary; if both move, then they may move in the same or in the opposite direction.)

An autonomous increase in demand for consumer goods has no inevitable effect on prices but will, instead, lower the discount rate. A lower discount rate is synonymous with an increase in social circulating capital, that is, the supply of consumer goods. In other words, an increase in demand automatically brings out an increase in supply; a decrease has the exact opposite effect. There is no such thing as an autonomous change of supply in the retail trade: supply is closely regulated by demand through the discount rate.

The myriad of goods passing through the hands of the producers and distributors on its way to the market undergoes remarkable changes when it gets within sight of the consumer. The uncertainty and unpredictability characterizing production at the earlier stages disappear, as if by magic, and are replaced by increasing certainty and predictability to the effect that the goods will finally be removed from the market by the ultimate consumer. There is a dramatic reduction in the risks involved in handling merchandise as it enters the gravitation of consumption. This fundamental observation motivates the following concept.

Social Circulating Capital

That mass of provisions and finished or semi-finished goods which has reached sufficient proximity, and is moving sufficiently fast, to the ultimate cash-paying consumer so that its destiny of being consumed presently could no longer be in doubt, is called social circulating capital. It does not include semi-finished goods that will not reach the consumers within 91 days (the length of the seasons of the year). Nor does it include goods that are moving too slowly or not at all (e.g., a store of goods held in anticipation of a price rise; goods to be sold on an installment plan; specialty and collectors' items, such as the surgeon's knife or artwork, which may or may not find an ultimate buyer within 91 days).

As we shall see, the volume and composition of social circulating capital is completely flexible. The dividing line between items that do or do not belong to it is subject to the change of the whim and fancy of the sovereign consumer on the shortest possible notice. Skipping ropes, as a rule, are not a part of social circulating capital —except during periods of skipping-epidemic among schoolgirls.

Liquidity

The risks and uncertainties, so characteristic of production in the early stages, all but disappear by the time the goods become part of social circulating capital. Speculation and other forms of risk-taking give way to the automatic and highly predictable processes of distribution. The reduction or disappearance of uncertainty and risks, occurring *pari passu* with the maturation of goods

on their way to the final consumer manifests itself in a most dramatic fashion in the form of liquidity. The movement of merchandise in great demand is mirrored by the opposite movement of bills of exchange. Liquidity refers to the spontaneous circulation of goods and bills of exchange. Goods which are part of social circulating capital are liquid in their own right and on their own merit, merely by virtue of their proximity and fast pace of movement to the consumer, which is mirrored by the bills drawn on them. The emergence of the bill market has made the circulation of purchasing media elastic. Henceforth only finished goods are sold against cash at the retail counter; semi-finished goods at various stages of production and distribution are traded against bills of exchange (equivalently, against bank deposits created by a commercial bank upon the collateral security of such bills). Before the end of each quarter all transactions are cleared, and all outstanding bills are paid out of the proceeds of the final sale of first-order goods into which fast-moving higher-order goods have matured.

The Marginal Shopkeeper

For the purposes of our analysis changes in the volume of social circulating capital, and changes in its composition, are of the highest importance. We shall now see how those changes are put into effect through arbitrage between the bill market and the consumer goods market. The arbitrageur is none other than the marginal shopkeeper. He makes the crucial decision which items to put on the shelf and which ones to withdraw. In these decisions he is guided by one considerations alone: the wishes of the sovereign consumer. For this reason, the *propensity to consume* can be identified with the volume or composition of social circulating capital. In fact, volume and composition are changing together. An increase (decrease) in its volume is manifested by an increase (decrease) in the variety of the component parts of social circulating capital.

It is curious that the agency translating the wishes of the sovereign consumer into changes in the stocks of retail shops through arbitrage between the bill market and the consumer goods market has escaped the attention of economists. The details are as follows. Each merchandise on the shelf of the shopkeeper has its own productivity measured by a ratio. This is the ratio between the percentage of the retail markup and the average length of the sojourn of this merchandise on the shelf (with due allowance to overhead costs). Thus, if the retail markup on $1 worth of sauerkraut is $\frac{1}{2}$ cent, and the average sojourn of a bottle of sauerkraut on the shelf is three months, then the productivity of sauerkraut is $\frac{1}{2} \div \frac{3}{12} = 2\%$ *per annum*.

Marginal Productivity of Social Circulating Capital

Merchandise with the lowest productivity on the shelf of the marginal shopkeeper, called the marginal item of social circulating capital, is critical to this analysis. This is the first item that will disappear from the shelf. As the propensity to consume declines, the marginal item will not be re-ordered by the marginal shopkeeper. No more bills will be discounted against its movement from the producer to the consumer. Another item on the shelf with a higher productivity will take its place as the marginal item. Conversely, as the propensity to consume rises, the marginal item is the new merchandise that is introduced on the shelf. Effective immediately, bills can be discounted against its movement to the final consumer. It replaces another item with a higher productivity.

The productivity of the marginal item is called the rate of marginal productivity of social circulating capital. It is the rate at which the opportunity cost of carrying the marginal item on the shelf becomes critical to the marginal shopkeeper (the first shopkeeper to change the composition of his stocks in response to changes in the propensity to consume). The reference is to the marginal shopkeeper's opportunity to carry in his portfolio bills drawn on other shopkeepers against faster-moving merchandise, rather than carrying on the shelf a marginal item. Indeed, the marginal shopkeeper is the arbitrageur who lets his stock of marginal merchandise run down without replenishing it while buying bills with the proceeds from this saving whenever the propensity to consume declines. This is arbitrage between the bill market and the consumer goods market. It enables the marginal shopkeeper to participate in the earnings of others operating with a higher productivity, thereby smoothing out variations in his income due to seasonal and other variations in demand. The marginal shopkeeper is also doing arbitrage in the opposite direction. As the propensity to

consume rises, he sells bills from his portfolio and orders some heretofore submarginal item which he may now be willing to carry on his shelves.

We shall now see that the rate of the marginal productivity of social circulating capital varies inversely with the propensity to consume: the lower the propensity, the higher is the rate of productivity, and vice versa. Slackening consumer demand increases the length of the sojourn of the marginal item on the shelf of the marginal shopkeeper. He will react by eliminating the old marginal item from the shelf. The new marginal item must have a higher productivity, otherwise it would also be eliminated. Thus lower propensity to consume brings about an increase in the marginal productivity of social circulating capital. The converse is also true. In case of a brisker demand for consumer goods the marginal shopkeeper can afford to widen his offering of goods. He will display a new marginal item on the shelves with lower productivity than the old marginal item. Thus higher propensity to consume thus brings about a decrease in the marginal productivity of social circulating capital.

This arbitrage of the marginal shopkeeper between the bill market and the consumer goods market is the centerpiece of disequilibrium analysis of price formation at the retail level. But what is the signaling system that carries information back-and-forth between shopkeepers concerning the propensity to consume and the marginal productivity of social circulating capital?

The Discount Rate

This signaling system is embodied by the discount rate. It is a change in the discount rate which alerts shopkeepers that coordination between the propensity to consume and the marginal productivity of social circulating capital has become necessary.

The discount rate is determined by the rate of the marginal productivity of social circulating capital. This is just the rate at which the opportunity cost of carrying the marginal item on the shelf becomes critical to the marginal shopkeeper. He is the first one among the shopkeepers to eliminate the marginal item from the shelf at the next uptick in the discount rate (conversely, to display a new marginal item on the shelf at the next downtick) —in view of his opportunity to carry in his portfolio bills drawn on other shopkeepers against faster-moving merchandise, rather than carrying slow-moving items on his shelves.

The short version of this theorem asserts that the discount rate is in fact identical with the rate of marginal productivity of social circulating capital. In order to prove this, first assume that the rate of marginal productivity of social circulating capital falls short of the discount rate. Then there is a spread between the two rates and, hence, a profitable arbitrage opportunity exists for the marginal shopkeeper. He can sell out his marginal merchandise and buy bills of exchange with the proceeds. Clearly, this activity of the marginal shopkeeper lowers the discount rate while it increases the rate of marginal productivity of the social circulating capital. This arbitrage will continue until the spread between the two rates is closed. The same argument, *mutatis mutandis*, shows that the spread between the two rates will also be closed in the case when the discount rate falls short of the rate of marginal productivity of the social circulating capital. In any case, the two rates are equalized, and we are justified in identifying them.

It is important to realize that a rise in the discount rate is heralding a fall in the propensity to consume, telling the marginal shopkeeper to discontinue the marginal item, making social circulating capital shrink. Conversely, a fall in the discount rate there is heralding a rise in the propensity to consume, telling the marginal shopkeeper to introduce a new item on his shelf, making social circulating capital expand.

The arbitrage of the marginal shopkeeper between the consumer goods market and the bill market is analogous to (but conceptually quite different from) the arbitrage of the marginal entrepreneur between the stock market and bond market, which is a regulator of rate of interest. Comparison of the two arbitrage operations reveals that the discount rate is fundamentally different from the rate of interest. The forces driving these rates are different. The engine bringing about a change in the rate of interest is a change in the propensity to save, while the engine bringing about a change in the discount rate is the change in the propensity to consume. In either case, the rate varies inversely with the propensity.

Of course, the person of the marginal shopkeeper and his choice of the marginal item x are subject to change. In choosing x the marginal shopkeeper is simply trying to read the mood

of the sovereign consumer. When another shopkeeper takes over that role from the first, his choice of the marginal item x' may well be different from x. In effect, he is comparing the productivity of x' to that of x. Indeed, at the time when the discount rate undergoes a change hundreds of different people may, one after another, play the role of the marginal shopkeeper, while x sweeps through a large number of candidates to serve as the marginal item of social circulating capital. This picture can be simplified if we personify the marginal shopkeeper and imagine that he is the gate-keeper acting on behalf of the sovereign consumer. He admits some items to social circulating capital while expelling some others. He constantly examines the credentials of items within his purview. He admits x whose productivity is higher, and expels x' whose productivity is lower than the discount rate. This, then, is the mechanism whereby the market integrates the scattered knowledge and power residing in individual shopkeepers concerning the marginal productivity of social circulating capital. This, then, is the intelligence whereby the mood of the sovereign consumer is perceived. The relevant information is crystallized in the form of a single variable, the discount rate.

Theory of the Retail Trade

It follows from the foregoing disequilibrium analysis that *the law of supply and demand does not apply in the retail trade*. The adjustment mechanism works, not on the prices of goods, but on the marginal productivity of social circulating capital or, what is the same, on the discount rate. An autonomous increase in demand for fast-moving consumer goods has no inevitable effect on prices but will, instead, lower the discount rate. This is synonymous with an instantaneous increase in the volume of the social circulating capital, that is, the supply of consumer goods. *Increased demand automatically brings out an equivalent increase in supply. A decrease in demand has the exact opposite effect*. There is no such thing as an autonomous change of supply in the retail trade: supply is closely regulated by demand through the mechanism of the bill market and the discount rate. The coordination problem, as applied to the retail trade in consumer goods, is solved by arbitrage operations of the marginal shopkeeper between the bill market and the consumer goods market. He is the gate-keeper who regulates the entry of consumer goods into social circulating capital.

Critique of the Quantity Theory of Money

Equilibrium economics, more especially the quantity theory of money (the latter-day champion of which is Milton Friedman), holds that a regime of floating foreign exchange rates is absolutely necessary as a balancing mechanism of foreign trade. If a country imports more than it exports, then the value of its currency will drop in the foreign exchange markets. As a result, the price of imported goods will rise, limiting imports and, at the same time, the price of this country's exports in foreign markets will drop, boosting exports. These effects redress trade imbalance. As a corollary, it is further asserted that if a drop in foreign exchange rates does not occur on its own accord, then the government is fully justified in pushing them down by hook or crook.

This is a vicious theory concocted to justify the government in engineering a destruction of the value of the currency. For decades, the U.S. government has been trying to reverse its unfavorable trade balance with Japan by crying down the value of the dollar. However, in spite of the great "success" of the U.S. government to debase its currency, trade imbalance has continued to worsen. It showed signs of abating only when the Japanese government also started debasing its own currency, the yen.

Disequilibrium analysis shows that if a country runs export surpluses, this will not cause an inevitable increase in domestic retail prices as predicted by equilibrium theory. The discount rate will drop in response to the inflow of foreign exchange. Merchants will draw bills on foreign countries with a higher discount rate. This will repel the invasion of foreign exchange. Higher consumer demand will be met by an expanded offering on the shelves of the shopkeepers, thanks to the lower discount rate. By the time the consumer is ready to spend the extra income, the extra merchandise will be in place. Conversely, if a country is stricken with a bad harvest or by some other natural calamity destroying crops, property, and goods, then there will be an immediate increase in the discount rate. Retail prices will not rise inevitably. The stricken country, thanks to its higher discount rate, is an attractive place on which to draw bills. This translates into an immediate in-

flux of short-term capital from abroad in the form of the most urgently needed consumer goods.

Of course, if the bill market is sabotaged through government intervention (in allowing the banking system to preempt the spontaneous circulation of bills of exchange), then the influx of foreign exchange will spill over to the stock, bond, and real estate markets, where rampant speculation may cause huge price increases. This may indeed lead, in due course, to a collapse —as it has happened in Japan, and as it will probably happen in the United States. The collapse must squarely be blamed on the vicious equilibrium theory of foreign exchange suggesting that trade imbalances can be cured by government-inspired debasement of the currency.

Disequilibrium theory treats the problem of trade imbalances as a coordination problem. It analyses short-term capital movement as it responds to the widening spread between the discount rate and the marginal productivity of social circulating capital. It takes into account arbitrage between the bill market and the consumer goods market. The mechanical quantity theory of money and other equilibrium theories are blind, barren, and misleading.

Summary

The disequilibrium analysis of retail trade and of short-term capital movements across international borders gives us an insight strikingly different from that offered by equilibrium economics and the quantity theory of money. In the retail trade, the law of supply and demand does not apply. An increase in the volume of purchasing media due to higher spending has no inevitable effect on prices but will, instead, lower the discount rate. This is equivalent to an increase in the marginal productivity of social circulating capital. Hence, increased demand automatically and instantaneously brings out an increased supply sufficient to accommodate it without an increase in prices. Price changes, whenever they occur, reflect other changes, having to do with the competition of producers and consumers.

In case of an influx from abroad of short-term capital foreign exchange first flows the bill market. It causes bill prices to rise. This is tantamount to a fall in the discount rate. Excess foreign exchange is absorbed by a commensurate increase in social circulating capital. Conversely, in case the country is losing short-term capital, foreign exchange is drained from the bill market. Bill prices fall, causing a rise in the discount rate. The outflow of foreign exchange corresponds to a shrinkage of social circulating capital. There is no reason to assume that across-the-board price changes take place in unison with an inflow or outflow of short-term capital.

The static, black-and-white and one-dimensional supply-and-demand equilibrium analysis of price formation is superseded by a dynamic, full-color, three dimensional bid-asked disequilibrium analysis, provided that we put arbitrage into the center of inquiry. Then can we present the problem in its proper context as a coordination problem. The price-quantity nexus of old-line equilibrium analysis is replaced by the multivariate price-quantity-quality nexus. Input and output become variables in their own right, as indeed they are in real life. There is no need to pay lip-service to a spurious supply-demand equilibrium.

We have seen that the *marginal shopkeeper* is doing arbitrage between the bill market and the consumer goods market, the outcome of which is the discount rate. Similar to this, although not treated here, is the arbitrage of the *marginal producer* between the bond market and the stock market, the outcome of which is the ceiling for the rate of interest; as well as the arbitrage of the *marginal bondholder* between the gold market and the bond market (i.e., between present goods and future goods), the outcome of which is the floor for the rate of interest. These are instances of arbitrage, examples of marginalism introduced by Menger, the prototype of which is the arbitrage of the marginal consumer between the consumer goods market and cash; and that of the marginal producer between the consumer goods market and the producer goods market the outcome of which is the asked and bid price. Every one of these instances of arbitrage is a manifestation of the coordination problem in economics as it starts from a state of relative disorder, or a lower state of coordination, and ends at a higher state of coordination, as measured by the asked and bid price of consumer goods, the asked and bid price of bonds (i.e., the ceiling and the floor for the rate of interest), the discount rate, etc.

We still have the two poles of contest. The formation of prices, the discount rate, etc., is still

seen as the result of a reconciliation between a pair of opposing forces (represented by the arbitrageur and the marginal arbitrageur). Yet it is more appropriate to describe ours as a disequilibrium model. The marginal arbitrageur is not a person but a role played by different protagonists changing the role from one moment to the next. Moreover, each protagonist playing that role may have a different set of values, different preferences, opportunities, foregone alternatives, and he may have a different time-horizon. Only the disequilibrium analysis of price formation can, when worked out in full detail, account for these differences. Only disequilibrium analysis can bring out the coordination problem confronting the entrepreneur, the producer, and the shopkeeper, not to mention the consumer himself.

Only the disequilibrium analysis of price formation can qualify as a theory of *action*. The old-line equilibrium paradigm is a theory of *non-action*. It is tantamount to a stage production of *Hamlet* in which the Prince is not allowed to appear.

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